

Advanced Amphibious Assault Vehicle Modeling & Simulation

Col (Sel)
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“The AAHV represents the signature mission of the United States Marine Corps. A truly amphibious vehicle that will replace the Marine Corps’ aging current system and provide the capability to maneuver, combat loaded with a Marine rifle squad at 20-25 knots in the water and maneuver cross country with agility and mobility equal or greater than that of the M1 Tank.

The AAHV will virtually revolutionize every facet of Marine Corps’ combat operations. It is one of the most capable all-around weapon systems in the world. The technology to meet these requirements has been demonstrated and the plan to produce this system represents the most operationally effective solution for meeting Marine Corps’ requirements.”

- General C. C. Krulak , USMC
Commandant of the Marine Corps



AAAV Program Overview... Technology Base

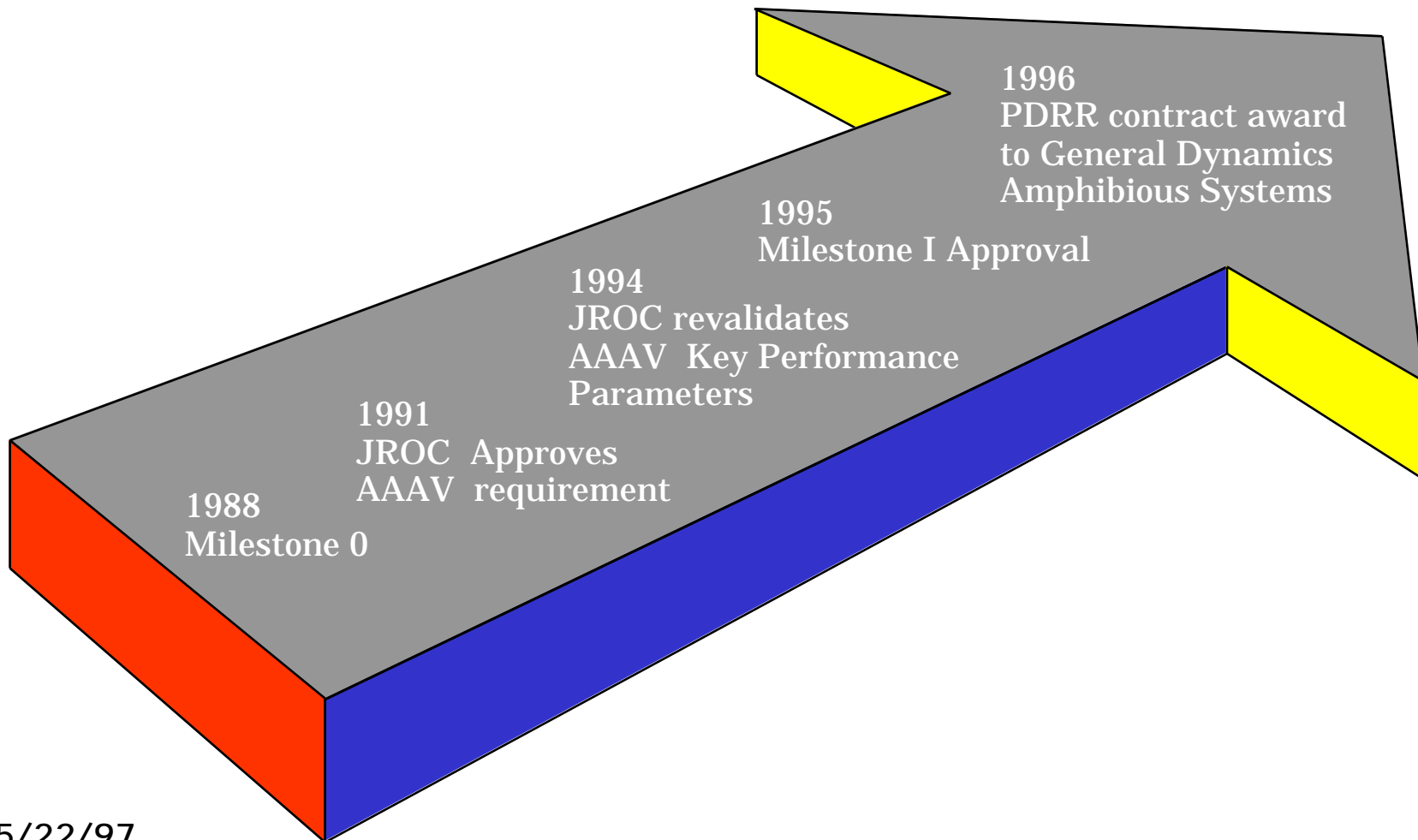


Nine years of Technology Base Development, five years with competing contracts: United defense limited Partnership and General Dynamics Land Systems.





AAAV Program Overview... Chronology



AAAV Modeling & Simulation

The Need

- 'Address Real Time Problems
 - STOM Doctrine/Tactics
 - Engineering Risk Reduction
 - Joint Interop.
 - Performance/Cost Trade-Offs
 - Training
 - Testing
 - Production Manufacturing

STRATEGY-APPLY VALIDATED
M&S TOOLS TO REAL
TIME NEEDS TODAY

Today

- 'Credible Legacy Engineering Models
 - Water Speed
 - Land Speed
 - Survivability/Armor
 - FirePower
 - NBC
- 'Highly Aggregated
 - Constructive
 - GroundWars
 - JCM
 - JANUS
 - CASTFOREM

Vision

- 'Simulation Based Design (SBD)
- 'Integrated M&S Environment
- 'DIS/HLA Network
- 'Battle Management STOW
- 'Virtual Prototyping

Not currently capable of addressing real-world warfare and design problems



AAAV PDRR Contract



- Develop and fabricate AAAV(P) (personnel variant)
- Period of performance is approximately 72 months
- First 30 months of this effort primarily focused on design development trade-offs; system, subsystem, and component trade-offs; and system, subsystem, and component selection, and not involve hardware fabrication and testing; the later part of the contract will cover prototype fabrication and testing
 - Extensive use of Modeling and Simulation (M&S) tools
- Cost-effective M&S tools to support economic and technical system trade-offs associated with core system requirements; supporting subsystem requirements; and engineering, logistics, and total system performance and effectiveness
- “Virtual AAAV:” M&S and IPPD efforts merge together through use of a single, near real time AAAV design database



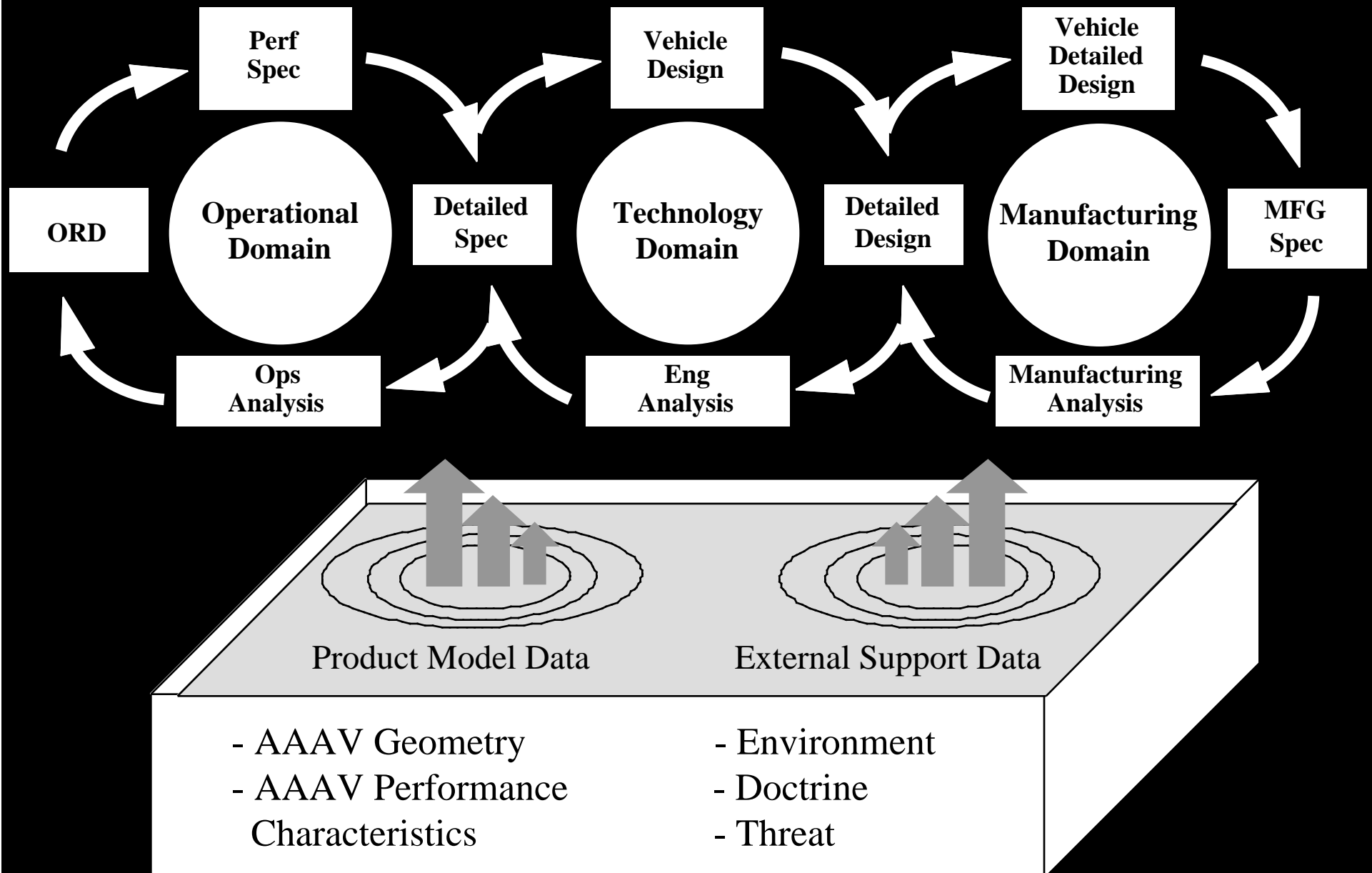
AAAV M&S Implementation

“State of the Practice” or “State of the Art”

**While the AAAV Program Cannot Afford to
Advance the “State of the Art” in M&S
Technology...**

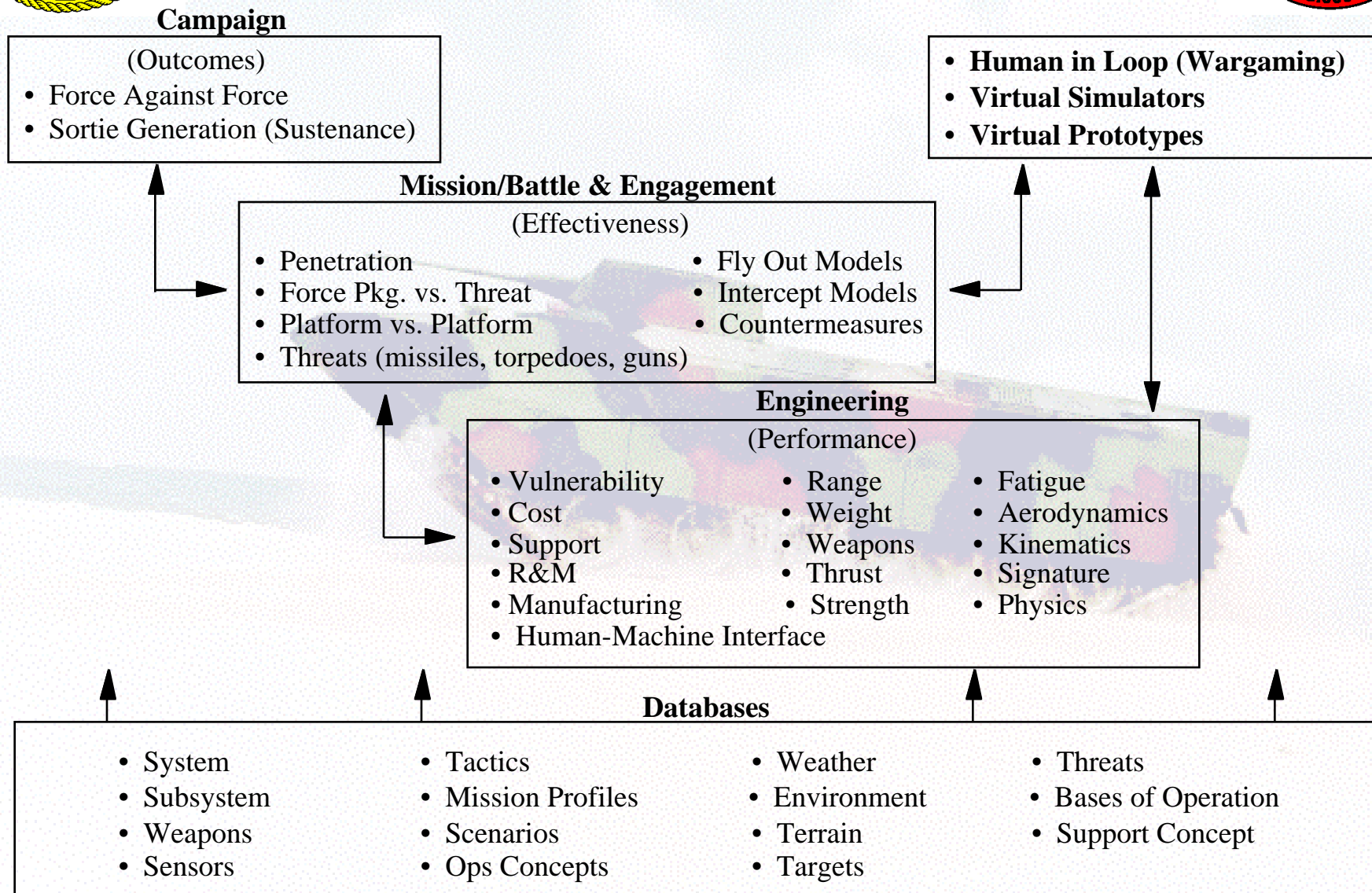
**Enhancing the APPLICATION of Existing
M&S Technologies is Vital for Program
Affordability**

AAAV Modeling & Simulation Implementation



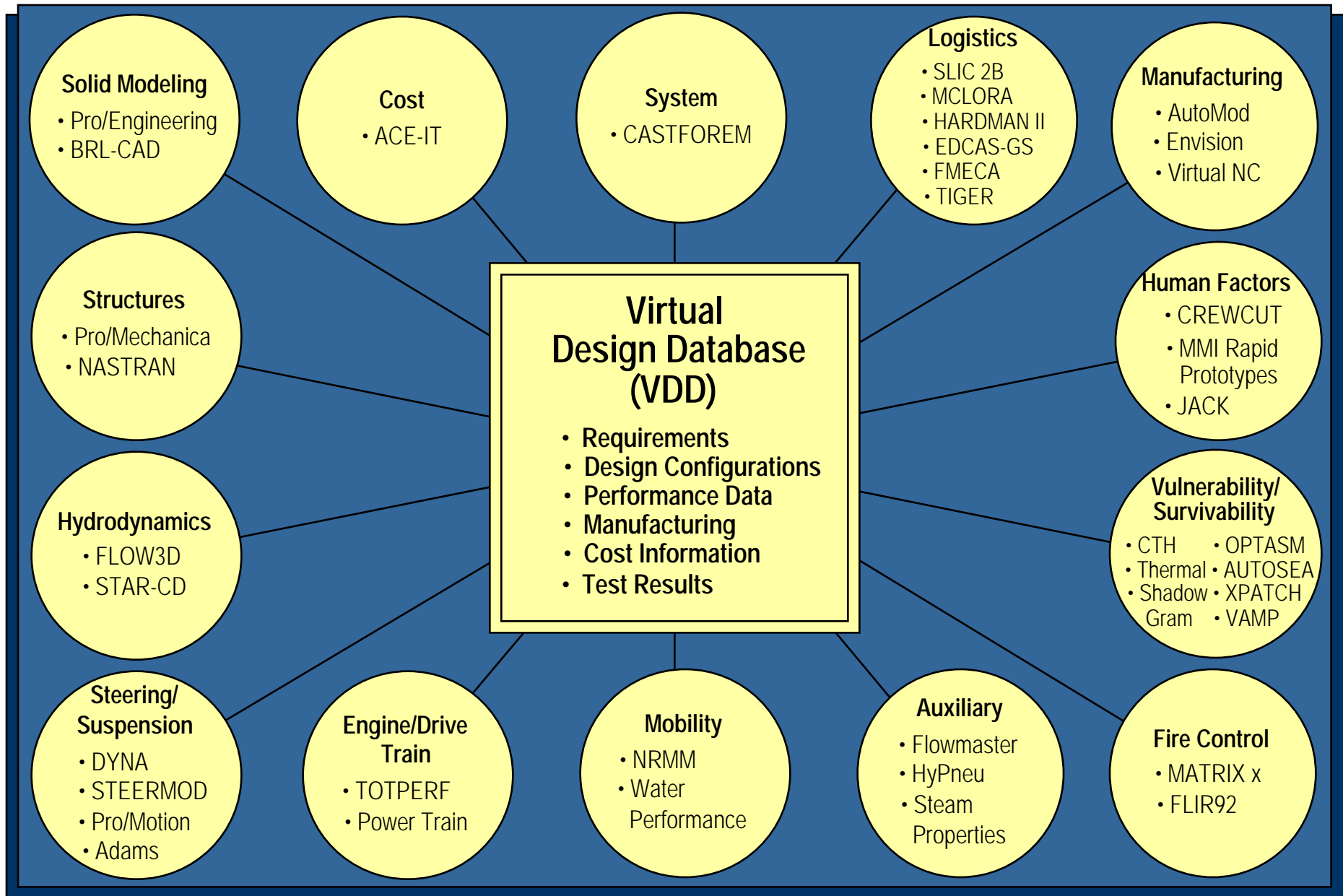


Integrated Modeling & Simulation Environment





AAAV Integrated Modeling and Simulation Architecture





AAAV FY96 Modeling & Simulation Accomplishments



- AAAV Battle Lab established
 - Procurement of DIS compliant Stealth
 - AAAV entity ported from MODSAF 1.51 to Marine Corp SAF 2.1
 - Reclassified AAAV from “Unique” Amphibious Class
 - Corrected Platoon Laydown
 - Acquired Marine Corps SAF and Navy SAF and incorporated AAAV
 - Acquired Terrain for use with SAF
- Modeling and Simulation Implementation Plan developed by JASON Associates
- TRAC WSMR - CASTFOREM modifications to support AAAV
- Scenario development and coordination with MCCDC and TRAC WSMR



AAAV FY96 Modeling & Simulation Accomplishments



- Establishment of AAAV Virtual Prototype
 - Virtual Design Database
 - Pro/E Model
- Modeling & Simulation Management Plan



AAAV FY97 Modeling & Simulation Accomplishments



- AAAV Whole System Trade Studies using CASTFOREM
- Scenario development with MCCDC & TRAC WSMR to incorporate in CASTFOREM
- Scenario development with MCCDC & TRAC WSMR using JANUS to incorporate in CASTFOREM
- Acquisition Reform Day - Support of user jury process in evaluating camera placement for AAAV driver visibility
- M&S Brown Bag Sessions - Education on use M&S Tools
- Plan for VV&A of Crew Station Simulator
 - Creation of Conceptual Model
 - Interface with Fleet Project Team for Accreditation
- Research on the applicability & use of VR technology to AAAV
- Analysis of TTP's for initial use on Crew Station Simulator



Modeling & Simulation



Accomplishments

- Completion of HLA compliant Crew Station Simulator
- AAAV scenarios for use with Crew Station Simulator
- VDD Maturity
- Continue interface with DARPA STOW PM and NRAD PM USMC SAF for future software upgrades
- Amphibious Working group with LPD-17 and V-22
- AAAV Marine Corps SAF development
 - AAAV Behavior development
 - AAAV Model in SAF
 - Visual representation of AAAV
 - Interface with Sea Model
- Integration of Simulator with Models/Analysis



AAAV FY97 Modeling & Simulation Accomplishments



- VV&A of Crew Station Simulator
- Obtain/Create terrain compatible with CASTFOREM scenarios via continued interface with TEC
- Support sub-system trade studies
- Investigate the utility of Instrumented Ergonomics



Summary



- AAAV using M&S when it is most effective
- Coordinated plan that deals with
 - Engineering
 - Training
 - Operational Needs
- Goal:
 - Invest in M&S to reduce schedule, cost, and technical risk
 - Impact the design as early as possible where the highest ROI is obtained
 - Get it right the first time